INTERNATİONAL JOURNAL OF AGRİCULTURE & BİOLOGY
1560–8530/2004/06–5–874–876
http://www.ijab.org

A Study on Comparison of Eggplant Population with Their Selfing Lines

V. PIRINÇ[1] AND A.Y. PAKYÜREK†
Horticulture Department, Agriculture Faculty, Dicle University, Diyarbakır, Turkey
†Horticulture Department, Agriculture Faculty, Harran University, Şanlıurfa, Turkey
[1]Corresponding author's e-mail: vedpir@sur.dicle.edu.tr

ABSTRACT

The objective of the present study was to compare local eggplant population of Diyarbakır with its selfing lines; after providing the purification of population by selfing. The seeds used in the experiment were obtained from Şeyhkent village of Diyarbakır city. Three breeding lines were developed by selfing method. The population and lines were compared for plant attitude, plant height, plant crown-width, length of internodes, length of leaf, length of flower stalk, colour (purple) of flower level, length of fruit stalk, length of fruit, diameter of fruit, colour of fruit at commercial harvesting and colour of flesh. Statistical differences were significant between population and its selfing lines, such as, about the plant crown-width. Şeyhkent 1 line had significant differences from its population. Şeyhkent 2 was significantly different from its local population for length of internodes and length of fruit. Rankit-Weighted Method was applied to the lines to choose the best line. Among the breeding lines, only Şeyhkent 3 had greatest degree (725 degree), so it can be evaluated to carry on the study with it.

Key Words: Eggplant; Population; Selection; Breeding

INTRODUCTION

In Turkey, eggplant (*Solanum melongena* L.) is a popular vegetable and its production in the country is enough to meet the requirement. Turkey has 970.000 ton eggplant production (Anonymous, 2002). Turkish people recognized eggplant nearly in 16-17 centuries (Şeniz, 1992). Eggplant like Şeyhkent has a great production and growing area in the cities of GAP (South-East Anatolian Project), Diyarbakir. Diyarbakir has 51.553 tons (Anonymous, 2003) eggplant production. From the beginning of agriculture till 19th century, efforts have been made to increase yield of eggplant by selecting high yielding genotypes from the natural population and by growing them in good conditions. In 20th century, by applying modern agricultural techniques (irrigation, fertilization, modern soil treatment techniques & struggle with diseases & harmful insects) and by using modern plant breeding methods, it is possible to achieve objective of high yields in vegetable (Hatipoğlu, 1993). Moreover, the local populations have interesting properties, such as resistance to high temperature, drought, stress and adaptability in the region (Abak, 1996). A wide range of diseases and parasites, Fusarium and Verticilium wilts attack eggplant (Sihachakr *et al.,* 1994). Eggplant exhibits partial resistance to most of its pests and pathogens and often at low level (Daunay *et al.,* 1991). But local population had tolerance to some disease and parasites in its local region. On the other hand, attempts at crossing eggplant with its wild relatives have had limited success due to sexual incompatibility (Kantharajah & Golegaonkar, 2004). It is essential to breed it by selfing method. It is expected that with the passage of time, new species of other vegetables may come on fore-front in the region and this region may loose some of the existing varieties. Therefore, it is imperative to protect the existing populations by conservation and improvement of breeding material.

This study aims to breed the local population using selection method (selfing) and so having pure homozygous selfing lines.

MATERIALS AND METHODS

This study was conducted during the vegetative seasons of 1997 and 1998 years at the research area of Horticulture Department of Agriculture Faculty, University of Harran. The seed used in the experiment was obtained from Şeyhkent, village of Diyarbakır. The population names were taken after the names of the village where they are grown. The seed was sown on April 11, 1997 and March 28, 1998 in seedling vials. The seedlings were transplanted in the experimental area on June 1, 1997 and May 22, 1998. The experiment was set up with 20 plants per plot, having 100 cm between rows and 50 cm within row spacing. The fruits were harvested during Sept. Oct. each year, when they appeared to attain physiological ripeness for seed production. In the first year of the study, the lines were obtained from the populations such as 3 lines from Şeyhkent after selection of breeding. The selfing was done to prevent foreign pollination. The selfing was done early in the morning from 6:30 till 9:30 and late in the evening from 17:30 till 19:30. The scales developed by UPOV (International Union for the Protection of New Varieties of

Plants) were used for varieties of *Solanum melongena* L. (Anonymous, 1998).

Observation on plant attitude, plant height (cm), plant crown-width (cm), length of internodes (cm), length of leaf (cm), length of flower stalk (cm), colour of flower purple level, length of fruit stalk (cm), length of fruit (cm), diameter of fruit (cm), colour of fruit at commercial harvesting and colour of flesh were made. The measurements about yield were yield (kg/da), weight of average fruit (g) and yield per plant (kg).

Variance analyses were applied to the results with Taris Statistical Software Program. T-Test was used to analyze the differences between averages. The data obtained from each line were compared with the data of its local population in order to determine the differences.

RESULTS AND DISCUSSION

Average values of features of plant attitude, plant length, plant crown-width and length of internodes are given in Table I. There were non-significant statistical differences between lines and their local population for the feature of plant attitude. For plant height the differences between lines and their local population were also non-significant (Table I). But plant height of all lines was shorter than the local population even though this was not significant by statistical means due to the effect of selfing, plant height in selfed lines becoming shorter. After 5-6 generations, this shorting will decrease as reported previously (Tosun & Sagsöz 1998). Seyhkent I line had significant differences by statistical means when comparing with its local population for plant crown-width. This was because of branching of plant especially from the bottom. Among the lines only Şeyhkent 2 was found significantly different from its local population for the length of internodes. This finding was partly similar with other researches (Pirinç & Pakyürek, 2001).

In Table II, statistical means are given for leaf length, flower stalk length, colour of flower of purple level and fruit stalk length. With respect to leaf length; there were some differences between lines and their local population. Şeyhkent 2 line had significant differences from its population. This line had smaller leaf length. There were no differences statistically between lines and the local population about the feature of length of flower stalk and colour of flower's purple level by statistical means. On the length of fruit's stalk differences were observed between lines and the local population. Şeyhkent I had significant differences by statistical means. If market demands and being practical for the harvest, takes attention, shorter fruit's stalk is recommended. Among the lines, only Şeyhkent I had shorter fruit stalk. The statistical averages of fruit's length, diameter of fruit, and colour of fruit at commercial harvesting and colour of fruit flesh are given in Table III. For the length of fruit, only Şeyhkent 2 was significantly different from the local population. The length of fruit in this line was shorter than local population. This finding is partly similar with others (Kaplan & Koludar, 1986). Şeyhkent 3 line was significantly different from the local population in terms of fruit diameter. The fruit diameter was greater in the lines, suggesting that the fruits were becoming fatter. This finding is similar with others (Pirinç, 1999). By the feature of colour of skin at commercial harvesting differences were non-significant between lines and the population, the lines can be similar with its population for this feature. This finding is similar with other reporters (Bletsos *et al.,* 2004). For the colour of flesh Şeyhkent 2 was significantly different from its population. The colour of flesh in this line was whitish and this was a recommended characteristic. The variation in some properties in the observed inbreeding lines was normal especially in plant and fruit characteristics. This finding has also been reported by other researchers (Gebeloğlu, 2001).

The values for yield (kg/da), weight of average fruit (g) and yield per plant of population and lines' are given in Table IV. As shown in the table, the yield (yield/da) of three lines was lower than population. All values of yield of lines expected to become even higher at the end of the breeding program.

Table I. Average values of plant attitude, plant height, plant crown-width and Length of leaf

Population / Lines	Plant attitude	Plant height (cm)	Plant crown-width (cm)	Length of internodes (cm)
Seyhkent	2.6(±0.8)	76.7(±7.9)	84.3 (±9.0)	6.2 (±0.9)
Seyhkent 1	3.0(±0.0)	68.6(±5.7)	61.3 (±11.1)**	6.2 (±0.6)
Seyhkent 2	3.0(±0.0)	75.2(±11.2)	83.5 (±4.4)	6.0 (±0.9)**
Seyhkent 3	2.2(±1.0)	70.6(±5.8)	75.1 (±10.1)	5.9 (±0.9)

Table II. Average values of length of leaf, length of flower stalk, colour of flower purple level and length of fruit stalk,

Population / Lines	Length of leaf (cm)	Length of flower stalk (cm)	Colour of flower (purple)	Length of fruit stalk (cm)
Seyhkent	19.4(± 2.1)	2.1(±0.5)	1.6(± 0.6)	5.8(±.0.4)
Seyhkent 1	17.7(±1.6)**	2.6(±0.4)	1.3(±0.4)	4.2(±.0.5)**
Seyhkent 2	19.7(±2.3)	2.3(±0.6)	2.0(±0.6)	5.6(±.1.2)
Seyhkent 3	19.0(±2.2)	2.2(±0.7)	1.6(±0.5)	5.4(±.0.8)

Table III. Average values of length of fruit, diameter of fruit, colour of fruit at commercial harvesting and colour of flesh

Population/ Lines	Length of fruit (cm)	Diameter of fruit (cm)	Colour of fruit at commercial harvesting	Colour of flesh
Seyhkent	18.4(±1.5)	4.2(±0.3)	1.6(±0.9)	1.5(±0.5)
Seyhkent 1	17.5(±1.1)	4.5(±0.4)	2.4(±0.9)	1.2(±0.4)
Seyhkent 2	17.0(±1.1)**	4.3(±0.5)	2.2(±0.9)	1.0(±0.0)**
Seyhkent 3	17.9(±1.3)	4.7(±0.3)**	1.1(±0.3)	1.6(±0.9)

(**significant at %5 Alfa, *: significant at%1 Alfa, n: 10 (number of example)) Scales for colour of flower of purple level: Dark purple: 1, middle purple: 2, light purple: 3

Table IV. The values yield (kg/da) weight of average fruit (g) and yield per plant (kg) of population and Lines

Population/ Lines	Yield (kg/da)	Average weight of fruit (g)	Yield/plant (kg)
ŞEYHKENT	7378	138	3.688
ŞEYHKENT I	4640	126	2.320
ŞEYHKENT 2	6636	205	3.318
ŞEYHKENT 3	5315	143	2.657

Table V. Rankit-Weighted Method*

Characteristics	Degre of ratio	Classification of features	Degre of Classes
Length of fruit (cm)	30	33-25	10
		25-20	6
		20-18	4
		18-15	2
level of fruit colour at commercial harvesting	25	Dark purple	10
		Dark purple-Purple	8
		Purple- Light purple	5
		Ligth purple	2
			1
Colour of flesh	5	Whitish	10
		Greenish	1
		Light green	3
Shape of apex	10	Rounded	10
		Pointed	5
		İntended	3
Level of brightness at fruit skin	20	Bright	10
		Semi bright	7
		Dull	3
Plant height (cm)	10	200-150	1
		150-100	10
		100-50	5

prepared by applying from Sürmeli and Şimşek

Table VI. Calculated degree of lines after Rankit Weighted Method*

Population/ Lines	Length of Fruit	Colour of fruit at commercial harvesting	Colour of flesh	Shape of apex	Level of brightness at fruit skin	Plant height	Total degre
ŞEYHKENT I	120	25	50	100	200	50	545
ŞEYHKENT 2	60	25	50	100	200	50	485
ŞEYHKENT 3	120	250	5	100	200	50	725

Among the lines, Şeyhkent I had lower value for weight of average fruit than population but the lines Şeyhkent 2 and Şeyhkent 3 had higher values than population. All lines had lower value of yield/plant than population. Şeyhkent population and breeding lines are cylindirc eggplant and this eggplant has delicious taste. In this region cylindiric eggplant consumed also it has some recommended fruit features such as whitish flesh colour, dark colour of fruit, long fruit etc. According to these recommended features; Weighted-Rankit Method is applied to select the best lines as shown in Table V. The lines that have 700 and more degree were selected, and are given in Table VI. The characteristics were evaluated by consumers and growers views with meeting by one by one[1]. From all these result, Şeyhkent 3 was choosing able to carry on the study with it. The yield of lines may have been higher at the end of the breeding program and also the quality of the fruits' will be better. 10-12 years ago breeding of this local population had began before our research but its breeding program could not complete thus it is considered necessary to restart this research.

REFERENCES

Anonymous, 2003. *FAO Statistical Database*. http://www.fao.org

Anonymous, 2003. *Ministry of Agricultural Diyarbakır Reginal Directorate, Recorded Files*. Diyarbakır, Turkey

Anonymous, 1988. *International Union for the Protection of New Varieties of Plants*. Eggplant, Aubergine, Eierfrucht TG/117/3

Bletsos, F., D. Roupakias, M. Tsaktsira and A. Scaltsoyjannes, 2004. Production and characterization of interspecific hybrids between three eggplant (*Solanum melongena* L.) Cultivars and *Solanum macrocarpon* L. *Scientia Horti.,* 101: 112–21

Daunay, M.C., R.N. Lester and H. Laterrot, 1991. The use of wild species for the genetic improvement of brinjal eggplant *(Solanum melongena* L.*)* and tomato *(Lycopersicon esculantum)*. *In*: Hawkes, J.C., R.N. Lester, M. Nee and N. Estrada (eds.). *Solanaceae III: Taxonomy, Chemistry, Evolution*. pp. 389–413. Royal Botanic Gardens Kew and Linnean Society, London

Gebeloğlu, N., 2001. Certain characteristics of inbreeding lines selected from tokat pepper population. *In: Proc. XIth Eucarpia Meeting on Genetics and Breeding of Capsicum and Eggplant*. pp: 212–6. April 9-13, Antalya, Turkey

Hatipoğlu, R., 1993 Introduction to biotechnology. Çukurova University. *Book of Agriculture Faculty No*., 129: 4–5, Adana-Turkey

Kantharajah, A.S. and P.G. Golegaonkar, 2004. Somatic Embryogenesis in Eggplant. *Scientia Horti.,* 99: 107–17

Kaplan, N., and J. Koludar, 1986. *Southeastern Anatolian Agri. Res. Inst. Ann. Rep.,* 349–350, Diyarbakır, Turkey

Pirinç, V. And A.Y. Pakyürek, 2001. An investigation on local eggplant populatioin of şanliuarfa with their selfing lines. *In: Proc. XIth Eucarpia Meeting on Genetics and Breeding of Capsicum and Eggplant*. pp: 233–7. April 9-13, Antalya, Turkey

Pirinç, V., 1999. An investigation on local eggplant populatioin of şanliuarfa with their selfing lines. *Master Thesis*. Science Institute of Harran University, Şanlıurfa, Turkey

Sürmeli, N., and G. Şimşek, 1991. Çorbaci pepper breeding. *Hort. J.,* 20:1–6

Şeniz, V., 1992. Tomato, Pepper and Eggplant Growing. *TAV Publication* (Yalova, Turkey), 26: 153, 174

Sihachakr, D., Daunay, M.C., Serraf, L. *et al.,* 1994. Somatic hybridisation of eggplant (*Solanum melongena* L.) with its close and wilt relatives. In: Bajaj, Y.P.S. (ed.). *Biotechnology in Agriculture and Forestry, Somatic Hybridisation in Crop Improvement*. Springer, Berlin

Tosun, F. and S. Sagsöz, 1998. *Plant Breeding*. pp: 4–5. Atatürk University, Agriculture Faculty Lesson Publisher. Erzurum, Turkey

(Received 02 April 2004; Accepted 23 April 2004)